



# MPI™ SERIES Instructional Manual

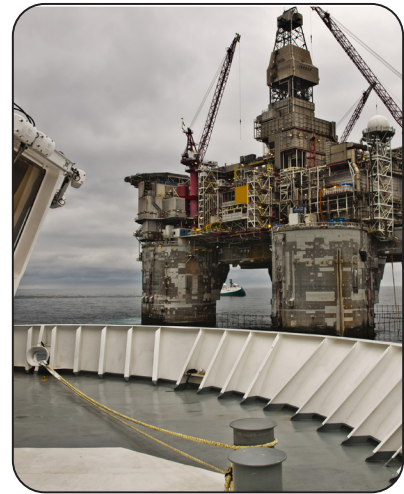
Air and Hand Pump:  
Setup and Preset Instructional Manual

Bulletin 4234-B1 | March 2025



## Table of Contents

MPI™ Overview .....	3
MPI™ Hydraulic Preset Tools .....	4
9 MPI™ Body Die with the MPI™ Large Preset Head .....	5
MPI™ Air Pump Kit, Setup .....	6
MPI™ Air Pump Kit, Presetting .....	9
MPI™ Hand Pump Kit, Setup .....	11
MPI™ Hand Pump Kit, Presetting .....	13
2507 Cone & Thread Tubing .....	15
Heavy Wall Annealed 316 Instrumentation Tubing.....	16
MPI™ Fitting, Assembly Instructions .....	17
Remake Instructions .....	17
MPI™ Fitting Presetting and Make Up Notes .....	18
MPI™ Connection - Reference Torques .....	18
Adapter Fitting Assembly Instructions .....	19
Tubing .....	23
Offer of Sale and Warranty .....	28



## MPI™ Overview

### Introduction

The MPI™ Presetting Instruction Manual documents the proper installation procedures for the MPI™ tube system. Parker MPI™ Fittings can be assembled either manually or by using hydraulic presetting equipment. This manual provides step by step instructions to successfully preset each type of tubing approved for use with MPI™ fittings using either manual or air driven presetting equipment.

### MPI™ Fittings Pressure Ratings

Parker Hannifin has designed all fittings and valves using the following ASME Standards and associated Safety Factors:

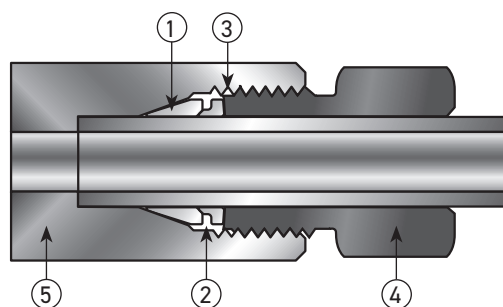
ASME B31.1 Power Piping  
ASME B31.3 Process Piping  
ASME B31.3 Chapter IX High Pressure Piping

A significant difference between these ASME standards is Safety Factor. MPI™ is designed to cover the requirements of all three standards with ASME B31.3 Chapter IX allowing safe use to 15,000 psi MAWP@RT. The design engineer is responsible to understand and choose the standard that meets the requirements of the application.

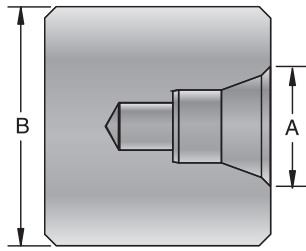
### Advanced Features

Every MPI™ Fitting has the features shown below:

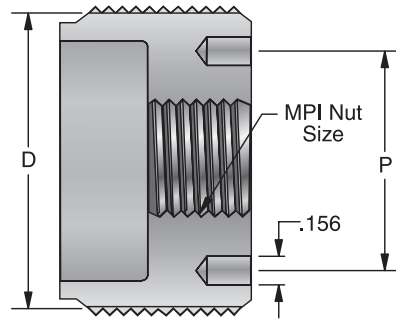
1. Front ferrule with corrosion-resistant Parker Suparcase® forms a seal between the tube, body and ferrule. It also provides a mechanical hold on the tube.
2. Back ferrule with corrosion-resistant Parker Suparcase® provides a strong mechanical hold on the tube.
3. Longer thread area for improved resistance to pressure and load on the ferrules.
4. Molybdenum disulfide-coated inverted nut helps prevent galling, provides easier assembly, and permits multiple remakes.
5. Long tube-support area improves resistance to vibration and line loads.



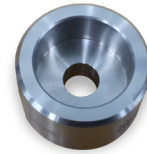
## MPI™ Hydraulic Preset Tools



**MPI™ Body Die**



**MPI™ Nut Die**



Parker Part No.  
9 MPI™ Body Die Adapter

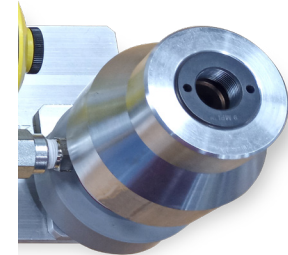


Parker Part No.  
MPI™ Nut Die Handle

### MPI™ Small Preset Assembly: Body Dies and Nut Dies Used

MPI Small Preset Assembly		Inches				
Body Die Part No.	Nut Die Part No.	A	B	D	P	MPI™ Nut Size
4 MPI Body Die	4 MPI Nut Die	.50	1.25	1.62	1.20	4
6 MPI Body Die	6 MPI Nut Die	.63	1.25	1.62	1.20	6
8 MPI Body Die	8 MPI Nut Die	.82	1.25	1.62	1.20	8
9 MPI Body Die	9 MPI Nut Die	.88	1.25	1.62	1.20	9

Dimensions in inches are for reference only, subject to change.



Parker Part No.  
MPI™ SMALL Preset Assembly

### MPI™ Large Preset Assembly: Body Dies and Nut Dies Used

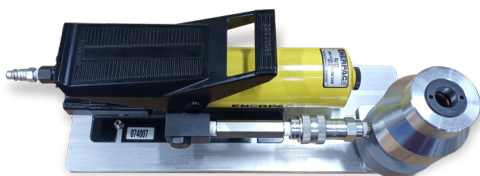
MPI Large Preset Assembly		Inches				
Body Die Part No.	Nut Die Part No.	A	B	D	P	MPI™ Nut Size
*9 MPI Body Die	9 MPI Large Nut Die	.88	1.25	2.00	1.67	9
12 MPI Body Die*	12 MPI Nut Die	1.13	1.75	2.00	1.67	12
16 MPI Body Die	16 MPI Nut Die	1.44	1.75	2.00	1.67	16

\* Requires a 9 MPI Body Die Adapter

Dimensions in inches are for reference only, subject to change.



Parker Part No.  
MPI™ LARGE Preset Assembly



Parker Part No.  
MPI™ AIR PUMP KIT



Parker Part No.  
MPI™ HAND PUMP KIT

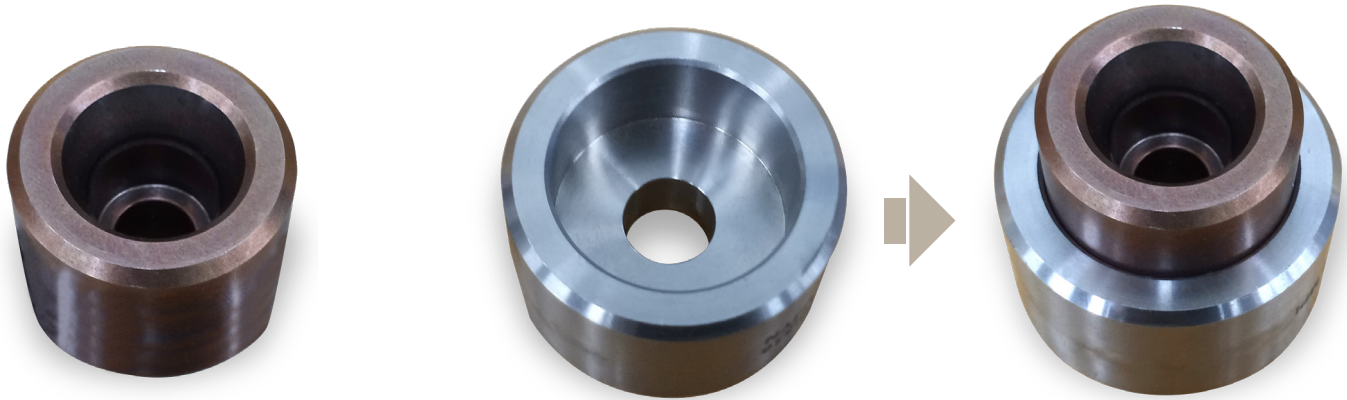
**Note:** One each Pump Kit, Preset Assembly, Body Die and Nut Die are required for presetting.

Pump Kits and Preset Assemblies can be interchanged but Body Dies and Nut Dies are for a specific Preset Assembly.



## Using the 9 MPI™ Body Die with the MPI™ Large Preset Head

**Step 1.** Place the 9 MPI™ BODY DIE into the 9 MPI™ BODY DIE ADAPTER



**9 MPI™ BODY DIE**

**9 MPI™ BODY DIE ADAPTER**

**ASSEMBLED**

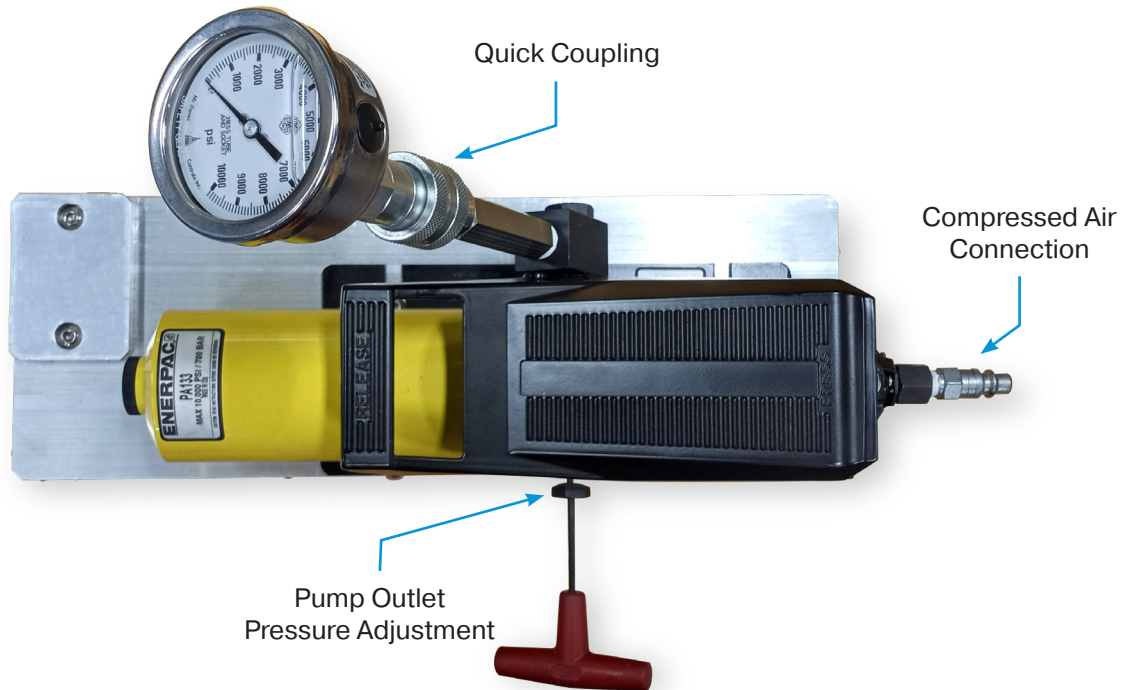
**Step 2.** Place the body die and die adapter into the MPI™ LARGE PRESET HEAD



**MPI™ LARGE PRESET HEAD**

## MPI™ Air Pump Kit - Setup

- Step 1.** Attach the Air Pump to a clean air supply of 60-120 psi and 9 scfm.
- Step 2.** Attach pressure gauge to air pump by pushing quick coupling on to the nipple and tightening the collar gently until it stops.



- Step 3.** Set pump preset pressure as follows. Identify the preset pressure for the preset head size (small or large), MPI™ fitting size and tube material from Tables 1 and 2. Remove the small black plastic cap on the swivel post and adjust the pump relief valve screw by inserting the Tee handle Allen wrench. Rotate the screw until the gauge reads the desired preset pressure with the pump activated. Refer to Pages 15 and 16 for additional presetting requirements for Cone & Thread tubing and Heavy Wall Annealed 316 tubing.

**TABLE 1**  
316 and 317 MPI™ Tube Preset Pressure

	Preset Pressure (PSI)		
	Fitting Size	Standard Ferrules	-XF Ferrules
Small MPI™ Preset Assembly	4	3,200	-
	6	4,000	-
	8	6,800	-
	9	8,500	-
Large MPI™ Preset Assembly	9	3,600	-
	12	5,200	6,000
	16	8,000	8,000

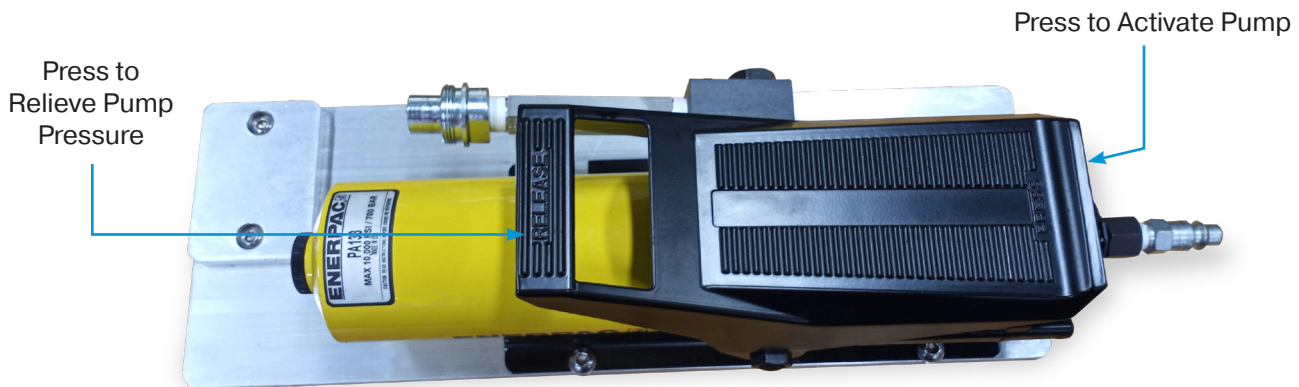
**TABLE 2**  
2507 MPI™ & Instrument Tube Preset Pressure

	Preset Pressure (PSI)		
	Fitting Size	Standard Ferrules	-XF Ferrules
Small MPI™ Preset Assembly	4	4,000	-
	6	4,400	-
	8	8,000	-
	10	4,400	-
Large MPI™ Preset Assembly	12	5,600	6,000
	16	8,800	8,000

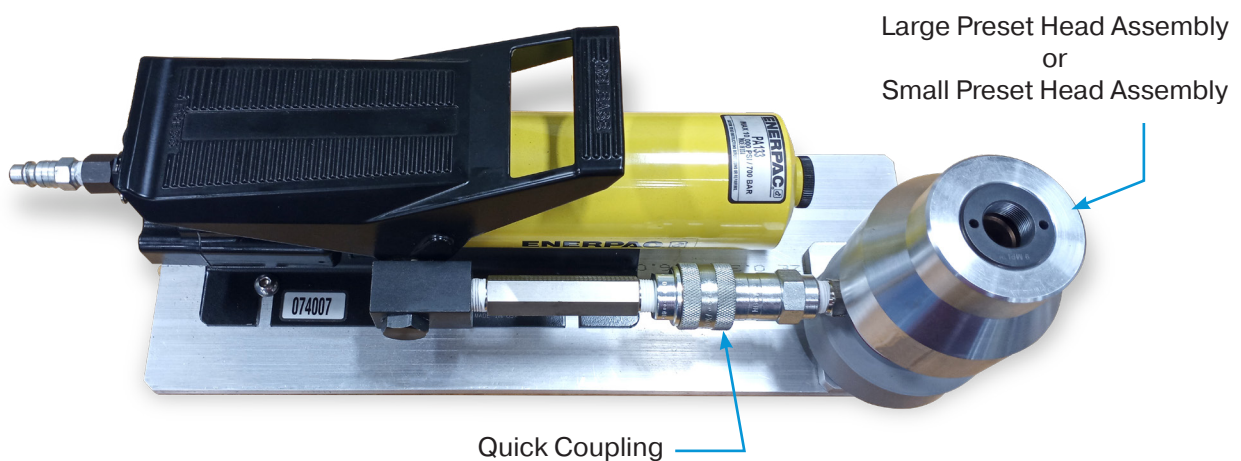


Pump Pressure Adjustment Screw is located inside Nut

- Step 4.** Relieve pump pressure by pressing the pedal down on the opposite side. Activate the pump again to check the preset pressure and then relieve the pressure again. After the gauge reads 0, unscrew the collar and remove the gauge by pulling straight out.



- Step 5.** Attach the preset head to the Air Pump by pushing quick coupling on to the nipple and tightening the collar gently until it stops.



- Step 6.** Sometimes air can become trapped in the hydraulic system which can cause longer preset times and a jerky preset motion. To bleed the air, rotate the preset head to point down and tilt the pump so the hydraulic line is inclined slightly upward from the head to the pump. Activate the pump briefly (2-3 seconds) and then relieve pressure. Activate and relieve pressure 2-5 times to remove the air.



- Step 7.** Rotate the Preset Head to point left, right, or up (depending on the desired angle of use) and the ram should rest flat against the pad.



Preset Head Angle Left

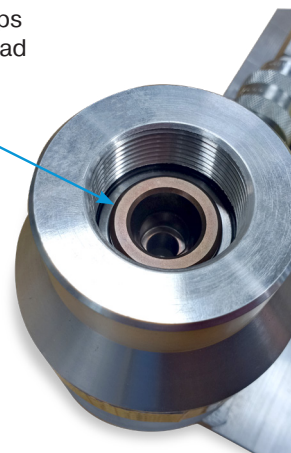


Preset Head Angle Right



Preset Head Angle Up

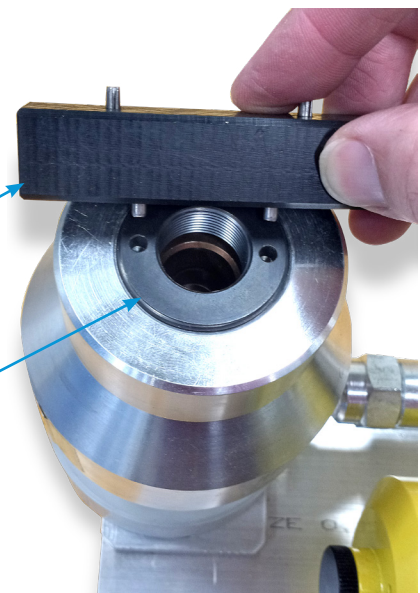
- Step 8.** Insert preset body die into the head with the tapered body seat pointing out. If using the 9 MPI™ BODY DIE with the LARGE MPI™ PRESET ASSEMBLY refer to the additional instructions on Page 5.

Tapered  
Body SeatBody Die Drops  
into Preset Head

- Step 9.** Screw the nut die into the preset head until it bottoms firmly against the bottom using the nut die handle. The face of the nut die should be approximately flush with the face to the top of the preset head.

**Important** - Size 12 and 16 nut die must be flush with top of preset head to properly preset -XF ferrules

Nut Die Handle

Nut Die flush with  
Preset Head

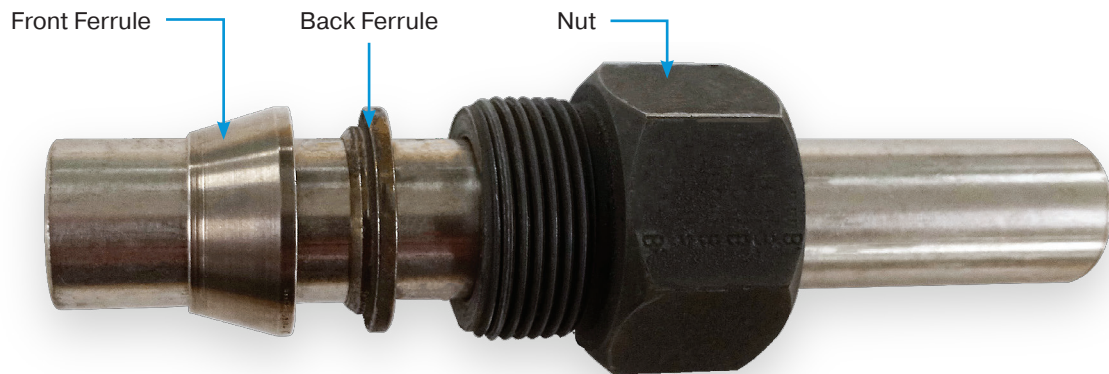
- Step 10.** The MPI™ Air Pump Kit is now ready for use.



## MPI™ Air Pump Kit - Pre-Setting

**Step 1.** Square cut the end of the tube and remove burrs from tube OD and ID.

**Step 2.** Slide nut and ferrules onto the tube with tapered end of ferrules pointed toward the end of the tube. (proper sequence is nut, short back ferrule and then longer front ferrule)

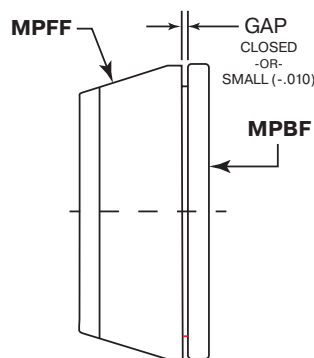


**Step 3.** Hold nut and ferrules on the tube while inserting the tube into the head and seat the end of the tube against the tube stop in the body die.



**Step 4.** Finger tighten (do not wrench) the nut into the nut die until the hex almost bottoms against the nut die. Leaving the nut approximately 1/4 turn from the nut die makes it easier to remove after presetting.

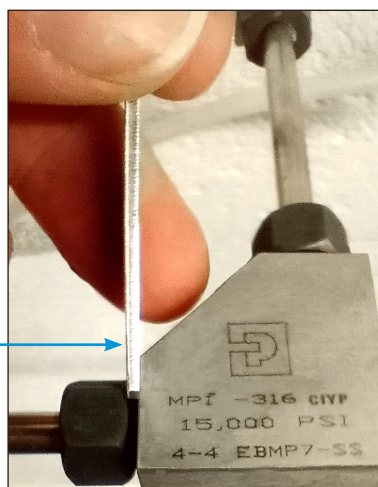
- Step 5.** Ensure tube is against body die stop and depress pump pedal until you hear the change in pump speed. Continue to depress pedal for at least 5 seconds. Pump speed should not slow sufficiently at the end of preset that individual strokes can be counted. <sup>(A)</sup>
- Step 6.** Relieve pressure by pushing down on the opposite side of the pedal and remove nut/ferrule assembly from the head by rotating the nut out. This should be easily done by hand without the use of a wrench.
- Step 7.** Inspect the preset nut/ferrule assembly to insure that the nut rotates easily, the ferrules are seated firmly on the tube (they do not rotate), and the gap between the ferrules is closed (there may be a slight gap due to ferrule spring). If ferrules rotate, check preset and setup steps for cause. <sup>(B, C)</sup>



- Step 8.** Insert the preset nut/ferrule assembly into the fitting body until the ferrules seat firmly and tighten the nut by hand to the finger tight position. Hold the fitting body with a wrench to prevent rotation as you continue to wrench tighten the nut 1/2 turn. (A sharp increase in resistance is immediately felt as the ferrules are fully seated.) Do not wrench the nut to pull restricted tubing into the body seat. <sup>(D,E)</sup>

- Step 9.** Check the gap between the nut and the body with the MPI™ GAP GAUGE. Insert the end of the gauge into the beveled gap between the nut hex and the body. Gently turn the gauge and it should “twist out” easily. If the gauge slides into the gap and does not “twist out”, the fitting is not assembled properly, and you must check the entire preset procedure. <sup>(F)</sup> Use of the MPI™ Gap Gauge is mandatory for Size 12 and Size 16.

**Proper Assembled MPI™ Fitting**  
MPI™ Gap Gauge **does not** fit  
between nut and body.



(A,B, C,D,E,F)

See Page 18: MPI™ Presetting & Makeup Notes for additional details.

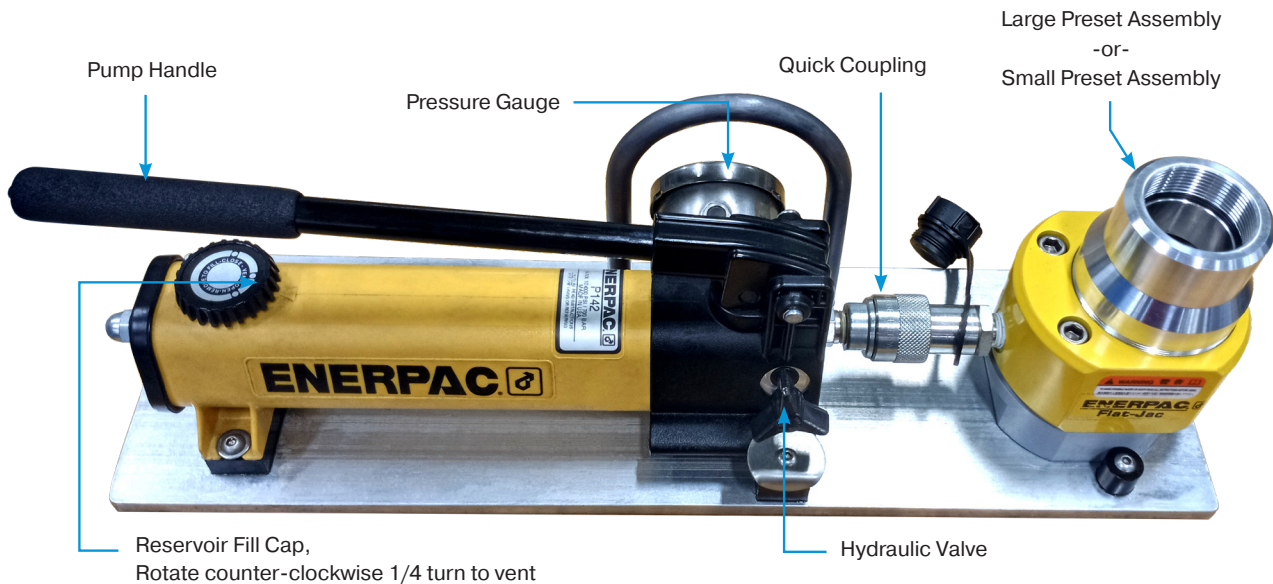
## MPI™ Hand Pump Kit - Setup

**Step 1.** Based upon the MPI™ fitting size and tube material select the proper preset head size and presetting pressure from Tables 1 and 2. Refer to Pages 15 and 16 for additional presetting requirements for Cone & Thread tubing and Heavy Wall Annealed 316 tubing.

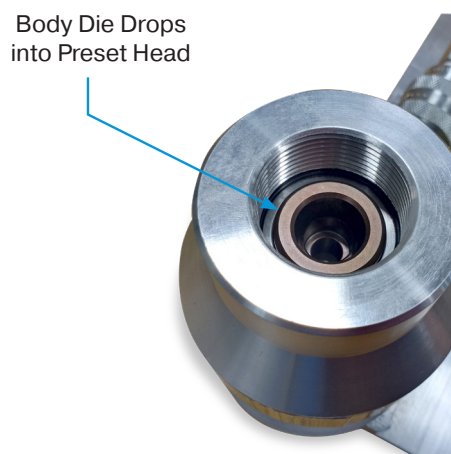
TABLE 1 316 and 317 MPI™ Tube Preset Pressure			
	Preset Pressure (PSI)		
	Fitting Size	Standard Ferrules	-XF Ferrules
Small MPI™ Preset Assembly	4	3,200	-
	6	4,000	-
	8	6,800	-
	9	8,500	-
Large MPI™ Preset Assembly	9	3,600	-
	12	5,200	6,000
	16	8,000	8,000

TABLE 2 2507 MPI™ & Instrument Tube Preset Pressure			
	Preset Pressure (PSI)		
	Fitting Size	Standard Ferrules	-XF Ferrules
Small MPI™ Preset Assembly	4	4,000	-
	6	4,400	-
	8	8,000	-
Large MPI™ Preset Assembly	10	4,400	-
	12	5,600	6,000
	16	8,800	8,000

**Step 2.** Attach preset head to the Hand Pump by pushing quick coupling on to the nipple and tightening the collar gently until it stops. Rotate the preset head to point right, or up (depending on the desired angle of use).

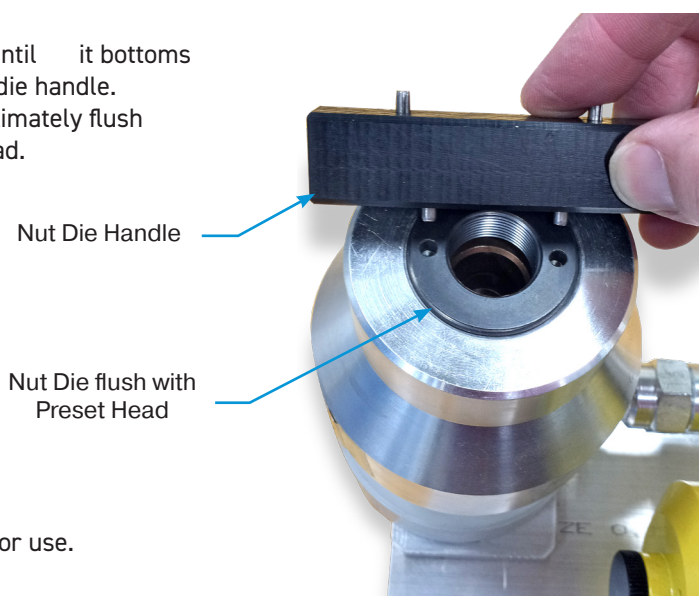


- Step 3.** Relieve the reservoir pressure on the pump by rotating the cap approximately 1/4 turn counter clockwise to the “vent” position. Remember to close the cap before transporting the pump or hydraulic fluid can leak from the reservoir. Due to the small volume of fluid used in presetting, the pump can be used with the vent cap in the closed position, but it still should be vented and closed occasionally to relieve pressure due to temperature changes, etc.
- Step 4.** Sometimes air can become trapped in the hydraulic system which can cause longer preset times and a jerky preset motion. To bleed the air, close the hydraulic valve by rotating handle clockwise until it stops. Pump the handle until light resistance is felt and the gauge starts to move. Tilt the pump so the head is straight down and relieve the pressure by turning the hydraulic valve counterclockwise. A gurgling sound will be heard if trapped air is forced back into the reservoir. Repeat this process 2-3 times to purge the air.
- Step 5.** Insert preset body die into the head with the tapered body seat pointing out. If using the 9 MPI™ BODY DIE with the LARGE MPI™ PRESET ASSEMBLY refer to the additional instructions on Page 5



- Step 6.** Screw the nut die into the preset head until it bottoms firmly against the bottom using the nut die handle. The face of the nut die should be approximately flush with the face to the top of the preset head.

Important - Size 12 and 16 nut die must be flush with top of preset head to properly preset -XF ferrules



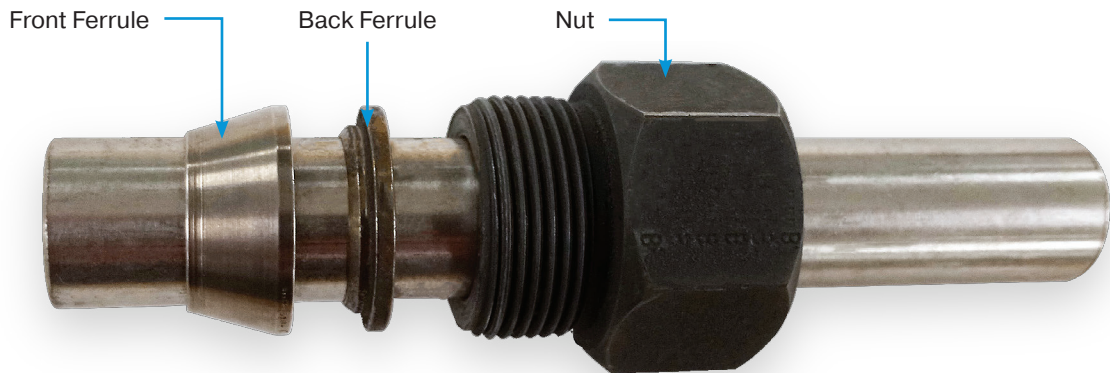
- Step 7.** The MPI™ Hand Pump Kit is now ready for use.



## MPI™ Hand Pump Kit - Pre-Setting

**Step 1.** Square cut the end of the tube and remove burrs from tube OD and ID.

**Step 2.** Slide nut and ferrules onto the tube with tapered end of ferrules pointed toward the end of the tube. (proper sequence is nut, short back ferrule and then longer front ferrule)

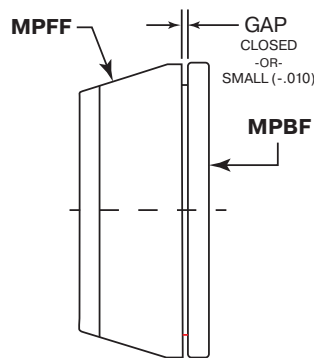


**Step 3.** Hold nut and ferrules on the tube while inserting the tube into the head and seat the end of the tube against the tube stop in the body die.



**Step 4.** Finger tighten (do not wrench) the nut into the nut die until the hex almost bottoms against the nut die. Leaving the nut approximately 1/4 turn from the nut die makes it easier to remove after presetting.

- Step 5.** Close the hydraulic valve by turning clockwise to a firm stop. Insure tube is against body die stop and pump the handle until the preset pressure is indicated on the gauge. Verify that the needle on the pressure gage is steady at the desired preset pressure. If the needle reaches the desired pressure and drops off continue slowly pumping the handle until the desired pressure is maintained.
- Step 6.** Relieve pressure by turning the hydraulic valve counter clockwise and remove nut/ferrule assembly from the head by rotating the nut out. This should be easily done by hand without the use of a wrench. .
- Step 7.** Inspect the preset nut/ferrule assembly to insure that the nut rotates easily, the ferrules are seated firmly on the tube (they do not rotate), and the gap between the ferrules is closed (there may be a slight gap due to ferrule spring). If ferrules rotate, check preset and setup steps for cause. <sup>(B, C)</sup>

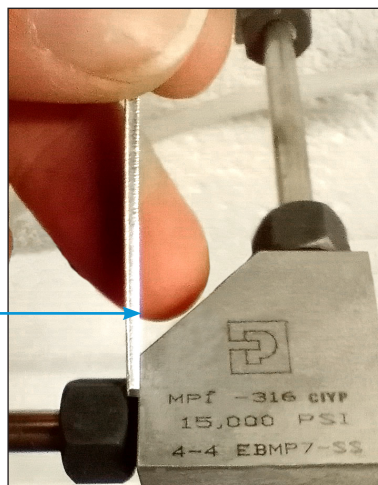


- Step 8.** Insert the preset nut/ferrule assembly into the fitting body until the ferrules seat firmly and tighten the nut by hand to the finger tight position. Hold the fitting body with a wrench to prevent rotation as you continue to wrench tighten the nut 1/2 turn. (A sharp increase in resistance is immediately felt as the ferrules are fully seated.)

**Do not wrench the nut to pull restricted tubing into the body seat.** <sup>(D,E)</sup>

- Step 9.** Check the gap between the nut and the body with the MPI™ GAP GAUGE. Insert the end of the gauge into the beveled gap between the nut hex and the body. Gently turn the gauge and it should “twist out” easily. **If the gauge slides into the gap and does not “twist out”, the fitting is not assembled properly, and you must check the entire preset procedure.** <sup>(F)</sup> **Use of the MPI™ Gap Gauge is mandatory for Size 12 and Size 16.**

Proper Assembled MPI™ Fitting  
MPI™ Gap Gage **does not** fit  
between nut and body.



(A,B, C,D,E,F)  
See Notes: MPI™ Presetting & Makeup  
for additional details.

## 2507 Cone and Thread Tubing

- Step 1.** All sizes of Cone and Thread tubing used with MPI™ fittings must be hydraulically preset.
- Step 2.** Setup and operate the MPI™ Air Pump per the procedures on pages 6 thru 8. Preset 316 Cone & Thread Tube to the pressures in Table 1. Use the presetting head assembly and pressures in Table 3 below for 2507 Cone & Thread Tube.

<b>TABLE 3</b> <b>2507 Cone and Thread Preset Pressure</b>		
	Fitting Size	Preset Pressure (PSI)
Small MPI™ Preset Assembly	4	3,200
	6	4,000
Large MPI™ Preset Assembly	9	3,600
	12	6,400
	16	8,000

- Step 3.** Setup and operate the MPI™ Hand Pump per the procedures on pages 11 and 12. Preset 316 Cone & Thread Tube to the pressures in Table 1. Use the presetting assembly and pressures in Table 3 above for 2507 Cone & Thread Tube.
- Step 4.** Assemble the MPI™ fittings per the procedure on Page 17 to Finger Tight plus ½ turn.
- Step 5.** Use the MPI™ Gap Gauge is to verify proper nut travel.

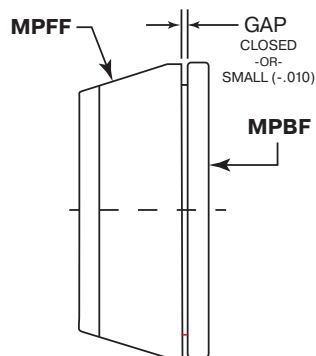
# Heavy Wall Annealed 316 Instrumentation Tubing

- Step 1.** Heavy wall annealed 316 instrumentation tubing may be assembled by hand or preset.
- Step 2.** Setup and operate the MPI™ Air Pump per the procedures on Pages 6 thru 8. Preset pressures may be reduced to minimize tube swell during presetting. **Refer to Table 4 below for the Minimum Preset Pressure for 316 Heavy Wall Annealed Tubing.**

<b>TABLE 4</b> <b>Annealed 316 Tube Minimum Preset Pressure</b>		
	Fitting Size	Preset Pressure (PSI)
Small MPI™ Preset Assembly	4	2,600
	6	3,200
	8	5,400
Large MPI™ Preset Assembly	10	3,300
	12	4,100
	16	6,400

## Additional Requirement for reduced presetting pressure:

Pressure must be greater than or equal to values in Table 4  
 Ferrule Gap must close completely:



- Step 3.** Setup and operate the MPI™ Hand Pump per the procedures on pages 8 and 11. Preset pressures may be reduced to minimize tube swell during presetting. **Refer to Table 4 for the Minimum Preset Pressure for 316 Heavy Wall Annealed Tubing.**
- Step 4.** Assemble the MPI™ fittings per the procedure on Page 17. Hand assembly (Non-Preset Ferrules) can be reduced to Finger Tight + 1 ¼ turns if the heavy wall annealed 316 tubing is sticking in the MPI™ fitting body. Preset ferrules must be assembled to Finger Tight + ½ turn.
- Step 5.** Use the MPI™ Gap Gauge to verify proper nut travel. Fittings that are assembled using either the reduced manual make up (FT+1 ¼) or reduced preset pressures (Table 4) can't be inspected using the MPI™ Gap Gauge.



## MPI™ Fittings: Assembly Instructions

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- Step 1.** Most Parker MPI™ Fittings can be easily assembled by hand but hydraulic preset is required for 3/4" and 1" to help insure proper makeup. See hydraulic presetting for details.
- Step 2.** Parker MPI™ Fittings are sold ready for use. Simply insert the tube until it bottoms in the fitting body. (If the fitting has been disassembled, loosen the nut, and ensure that the tapered ends of both ferrules point toward the body with the longer ferrule in front.)
- Step 3.** Turn the nut to the "finger-tight" position. Hold the fitting body with a wrench to prevent rotation as you continue to wrench tighten the nut 1 1/2 turns for hand assembly (1/2 turn only for a preset connection).  
**Parker recommends marking the nut and body with a scribe or marker to help count turns.**
- Step 4.** Check the gap between the nut and the body with the MPI™ GAP GAUGE. Insert the end of the gauge into the beveled gap between the nut hex and the body. Gently turn the gauge and it should "twist out" easily. **If the gauge slides into the gap and does not "twist out", the fitting is not assembled properly, and you must check the entire assembly procedure.** <sup>(F)</sup>  
**Use of the MPI™ Gap Gauge is required for Size 12 and Size 16.**

(F) See Page 18: MPI™ Presetting & Makeup Notes for additional details.

## Remake Instructions

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- Step 1.** For Maximum remakes, mark the fitting and nut before disassembly.
- Step 2.** Before retightening, insert the nut and ferrule assembly until the ferrules seat firmly in the body and tighten the nut by hand to the finger tight position.
- Step 3.** Hold the fitting body with a wrench to prevent rotation as you continue to wrench tighten the nut to the original position (or very slightly beyond).  
(A sharp increase in resistance is immediately felt as the ferrules are fully seated.)  
**Do not wrench the nut to pull restricted tubing into the body seat.** <sup>(C,E)</sup>

(C,E) See Page 18: MPI™ Presetting & Makeup Notes for additional details.

## MPI™ Fittings Presetting and Make Up Notes

- A.** Pump speed should not slow down sufficiently at the end of presetting that you can count the strokes (less than 2 strokes/sec). Pump speed does not affect relief valve preset pressure, but it can result in the operator stopping the pump before the connection is fully preset. This is usually an indication of insufficient air supply (volume and/or pressure), a contaminated air supply (moisture and/or particles) or a damaged pump.
- B.** Ferrule rotation is a simple first indication of improper preset and can be an indication of improper setup, preset pressure, insufficient air supply, etc. All steps of setup and preset should be checked until the cause is identified and corrected. The gap between the ferrule flanges after preset is dependent on many factors (tube OD & hardness, fitting size, etc.) but is barely detectable by naked eye. In general, it is less than .012" and usually less .008".
- C.** A Tube Insertion Gauge can be provided (if needed) to verify proper tube insertion after preset, makeup, and remake. This is a Parker diagnostic tool normally used to help determine cause of an assembly problem and not usually used as part of standard preset or assembly procedure.
- D.** In some applications where final assembly is very difficult to access, the user may prefer to complete the assembly in a vise where it is easier to ensure proper makeup and then mark the nut/body position. The connection is then separated and reassembled (remade) in the final location making sure that the nut/body marks align as there is a sharp increase in resistance.
- E.** Properly preset ferrules are firmly attached to the tube but do not reach full tube holding capability until they are reinforced by the body seat. Therefore, preset ferrules should not be used to pull a near rigid tube configuration into the body seat. This could cause the ferrules to break over their original grip/bite on the tube and significantly reduce their holding power.
- F.** The MPI™ GAP GAUGE can help identify connections that are significantly under-made. The gauge can be used with any size MPI™ fitting and is required for ¾" and 1" fittings.

Use of the gap gauge is recommended for all sizes of MPI™ where the final assembly is difficult to access or in situations that could inhibit proper assembly. The inspection gauge is most effective on the initial makeup of the connection and if other assembly factors were checked (ferrule) orientation, tube insertion, etc.). It is much less effective for remakes due to ferrule spring and variations in initial makeup.

## MPI™ Connection: Reference Torques

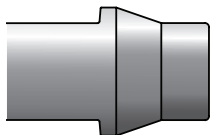
MPI™ fittings should always be assembled, preset, or remade as indicated in the instructions if possible. However, it is difficult in some instances to find the finger tight position, the original position was not marked, etc. The reference torques listed below can be used as a baseline to check connections that are in doubt. These torques do not replace other assembly instructions and do not guarantee a leak tight connection but can provide assistance in some situations.

Size 4	300 in-lb	25 ft-lb	35 N-M
Size 6	500 in-lb	40 ft-lb	55 N-M
Size 8	780 in-lb	65 ft-lb	90 N-M
Size 9	960 in-lb	80 ft-lb	110 N-M
Size 12	2000 in-lb	165 ft-lb	255 N-M
Size 16	4200 in-lb	350 ft-lb	475 N-M

## Adapter Fitting Assembly Instructions

The Maximum Allowable Working Pressure (MAWP) for some connection designs in this section may exceed the MAWP of the tubing or MPI™ connection. The system MAWP is determined by the lowest rated component used in the system.

### MPI™ Machine Ferrule



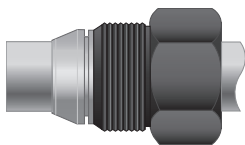
All sizes are assembled to Finger Tight plus ½ turn.

### MPI™ Tube Stub



1. The MPI™ ferrules and Nut may be installed on a MPI™ tube stub by either manual makeup in an MPI™ body or by Hydraulic presetting.

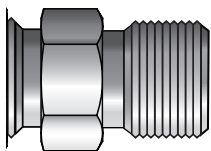
- The manual make up procedure is the same as for MPI™ tubing.



2. If the ferrules have been hydraulically preset on the tube stub, then final assembly in a MPI™ body will be Finger tight plus ½ turn.

- The Size 12 & 16 MPI™ tube stubs are only available from the factory with preset MPI™ nut and -XF ferrules and will look like the image on the left.

### Parker Type 'M' Hose Connection

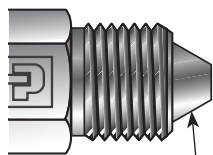


Fitting has internal 60° seat and connects to Parflex Ultra High Pressure Hose  
Assemble the connection finger tight and torque to the values in the table.

Size	Thread	Assembly Torque (ft-lb)	MAWP (psig)
6	9/16-18 UNF	25-30	60,000
8	3/4-16 UNF	40-50	30,000
10	7/8-14 UNF	50-60	50,000
12	1-12 UNF	75-85	30,000
16	1-5/16-12 UNF	100-120	20,000

## Adapter Fitting Assembly Instructions

### Parker X41 High Pressure Cone and Thread - 60,000 PSI MAWP

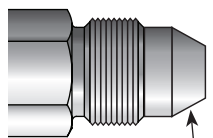


Conical Sealing  
Surface (Seat)

1. Apply a thin film of a system compatible lubricant to the seat.
2. Thread X41 connection into the mating port.
3. Tighten to the specified torque in table.

Size	X41 Assembly Torque (ft-lb)	Orifice I.D. (inches)
4	25	.093
6	50	.156
9	75	.188

### Parker X42 Medium Pressure Cone and Thread - 20,000 PSI MAWP

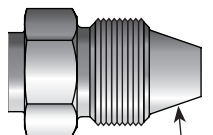


Conical Sealing  
Surface (Seat)

1. Apply a thin film of a system compatible lubricant to the seat.
2. Thread X42 connection into the mating port.
3. Tighten to the specified torque in table.

Size	X42 Assembly Torque (ft-lb)	Orifice I.D. (inches)
4	15	.109
6	25	.206
9	55	.360
12	75	.438

### Parker X44 Medium Pressure Connection - 20,000 PSI MAWP



Conical Sealing  
Surface (Seat)

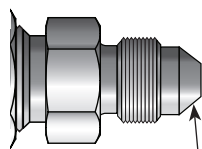
1. Apply a thin film of a system compatible lubricant to the seat.
2. Thread X44 connection into the mating port.
3. Tighten to the specified torque in table below.

Size	X44 Assembly Torque (ft-lb)
6	40
9	80
12	165



## Adapter Fitting Assembly Instructions

### Parker Triple Lock 37° Flare Connection



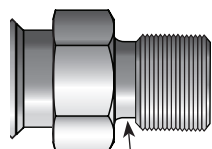
Conical Sealing  
Surface (Seat)

1. Apply a thin film of a system compatible lubricant to the seat.
2. Thread the TripleLock connection into the mating port.
3. Tighten to the specified torque in table below.

Size	Assembly Torque (-0% +10%) (ft-lbf)	FFWR*	MAWP (psig)	CH IX MAWP (psig)
4	130	2-1/2	15,000	20,000
6	235	2-1/2	12,500	20,000
8	525	2-1/2	12,500	20,000
12	950	1-1/2	10,000	15,000
16	1400	1	7,200	15,000

\*FFWR = Flats from Wrench Resistance

### SAE J1926/2 Heavy Duty Connector



O-Ring  
Location

1. Install lubricated o-ring on threaded stud.

Size	O-Ring Size Code	MAWP (psig)
4	3-904	12,500
6	3-906	12,500
8	3-908	12,500
12	3-912	10,000
16	3-912	6,600

2. Thread connector into port and tighten to the specified torque or FFFT from the table.

Size	Torque (in-lbf)	F.F.F.T*
4	255	1.5±.25
6	655	1.5±.25
8	1200	1.5±.25
12	2100	1.5±.25
16	3050	1.5±.25

\*F.F.F.T = Facets From Finger Tight

Torque values are for fittings assembled with a lubricated O-Ring

## Adapter Fitting Assembly Instructions

### NPT Tapered Pipe Threads

1. Apply a system compatible pipe sealing tape or paste to the external threads of the pipe connection. Apply sealant to all threads to prevent galling.
  - a. If using PTFE pipe tape wrap the external thread with 1 ½ to 2 turns in the clockwise direction when viewed from the pipe thread end.
2. Thread the connector into the port finger tight
3. Wrench tighten the pipe connector.

NPT Pipe Size	NPT Thread	Turns From Finger Tight
1/4	1/4-18	2-3
3/8	3/8-18	2-3
1/2	1/2-14	2-3
3/4	3/4-14	2-3
1	1½ -11	2-3

4. Never back off (loosen) pipe threaded connectors to achieve alignment on shape fittings.

NPT Pipe Size	MAWP (psig)
1/4	15,000
3/8	15,000
1/2	15,000
3/4	10,000
1	10,000

## Tubing: 316/317

The tubing working pressure charts below are all calculated for room temperature applications. Temperature derate factors are provided so that the appropriate elevated temperature working pressure may be calculated.

For some tube materials working pressure ratings and temperature derating factors are provided for standard rules, ASME B31.3 CH 2, and High-Pressure rules, ASME B31.3 CH IX, applications. It is the responsibility of the system design engineer to choose the proper design code for their application.

### MPI™ and Cone & Thread Tubing Charts

#### 316 or 317 Parker MPI™ Tube

				Maximum Allowable Working Pressure (psi)	
Tube Size (in.)	Nominal O.D. (in)	Nominal I.D. (in)	Wall Thickness (in)	ASME B31.3, CH2 (plsi)	ASME B31.3, CHIX
1/4	0.250	0.125	0.063	15,000	20,000
3/8	0.375	0.219	0.078		
9/16	0.562	0.344	0.109		
3/4	0.750	0.469	0.141		
1	1.000	0.656	0.172	12,500	19,000

#### 316 Autoclave Cone & Thread Tube

				Maximum Allowable Working Pressure (psi)
Tube Size (in.)	Nominal O.D. (in)	Nominal I.D. (in)	Wall Thickness (in)	ASME B31.3, CH2 (plsi)
1/4	0.250	0.109	0.071	12,500
3/8	0.375	0.203	0.086	
9/16	0.562	0.312	0.125	
9/16	0.562	0.359	0.102	10,000
3/4	0.750	0.516	0.117	
1	1.000	0.688	0.156	

- Use with MPI™ in ASME B31.3 CH 2 Applications
- MPI™ Ferrules shall be preset

### Temperature Derate Factors (316/317 Cold Drawn Parker MPI™ and Autoclave Cone & Thread Tubing)

Temperature Derating Factors										
°F	-425 °F to 100 °F	200 °F	300 °F	400 °F	500 °F	600 °F	700 °F	800 °F	900 °F	1000 °F
°C	-254 °C to 38 °C	93 °C	149 °C	204 °C	260 °C	316 °C	371 °C	427 °C	482 °C	538 °C
B31.3. Ch 2	1.00	1.00	1.00	.96	.885	.0823	0.795	0.77	0.75	0.74
B31.3. Ch IX	1.00	1.00	.97	.95	.93	.09	0.86	0.83	0.82	0.78

## Tubing: 2507

### MPI™ and Cone & Thread Tubing Charts

#### 2507 MPI™ Tube

				Maximum Allowable Working Pressure (psi)	
Tube Size (in.)	Nominal O.D. (in)	Nominal I.D. (in)	Wall Thickness (in)	ASME B31.3, CH2 (plsi)	ASME B31.3, CHIX
1/4	0.250	0.165	0.043	15,000	20,000
3/8	0.375	0.250	0.063		
9/16	0.500	0.334	0.083		
3/4	0.750	0.500	0.125		
1	1.000	0.669	0.166		

#### 2507 Autoclave Cone & Thread Tube

				Maximum Allowable Working Pressure (psi)
Tube Size (in.)	Nominal O.D. (in)	Nominal I.D. (in)	Wall Thickness (in)	ASME B31.3, CH2 (plsi)
1/4	0.250	0.109	0.071	15,000
3/8	0.375	0.203	0.086	
9/16	0.562	0.359	0.102	
3/4	0.750	0.510	0.120	10,000
1	1.000	0.682	0.159	

- Use with MPI™ in ASME B31.3 CH 2 Applications
- MPI™ Ferrules shall be preset

### Temperature Derate Factors (2507 Parker MPI™ and Autoclave Cone & Thread Tubing)

Temperature Derating Factors					
°F	-58 °F to 100 °F	200 °F	300 °F	400 °F	480 °F
°C	-50 °C to 38 °C	93 °C	149 °C	204 °C	260 °C
2507 Annealed	1.00	0.9	0.86	0.82	0.81

## Tubing: Commercial

### Commerical Tube Charts

#### 316/317 Heavy Wall Annealed Instrument Tube

Tube Size (in.)	Tube Wall Thickness (in)								
	0.065	0.083	0.095	0.109	0.120	0.134	0.156	0.188	0.220
	MAWP (psi)								
1/4	10,300	13,300	-	-	-	-	-	-	-
3/8	6,600	8,600	10,000	11,700	-	-	-	-	-
1/2	-	6,700	7,800	9,100	10,000	11,400	-	-	-
3/4	-	-	-	5,800	6,400	7,300	8,600	10,600	-
1	-	-	-	-	4,700	5,300	6,200	7,700	9,200

- Use with MPI™ in ASME B31.3 CH 2 Applications

#### Temperature Derate Factors (2507 Parker MPI™ and Autoclave Cone & Thread Tubing)

	Temperature Derating Factors									
°F	-425 °F to 100 °F	200 °F	300 °F	400 °F	500 °F	600 °F	700 °F	800 °F	900 °F	1000 °F
°C	-254 °C to 38 °C	93 °C	149 °C	204 °C	260 °C	316 °C	371 °C	427 °C	482 °C	538 °C
316/217 Annealed	1.00	1.0	1.0	0.97	0.9	0.85	0.82	0.80	0.78	0.77



## Tubing: Commercial

### Commerical Tube Charts

#### ASTM A789 Annealed Seamless 2507 Instrumentation Tube

Description	MAWP (psi)	
	B31.1, Ch II	B31.3, Ch IX
	(psi)	
1/4 x 0.35 wall	9,950	14,150
1/4 x 0.49 wall	14,500	20,000
3/8 x 0.35 wall	6,450	9,100
3/8 x 0.49 wall	9,300	13,200
3/8 x 0.65 wall	12,700	18,300
3/8 x 0.83 wall	15,000	20,000
1/2 x 0.49 wall	7,250	10,250
1/2 x 0.65 wall	9,900	14,050
1/2 x 0.83 wall	13,000	18,700
1/2 x 0.95 wall	15,000	20,000

Description	MAWP (psi)	
	B31.1, Ch II	B31.3, Ch IX
	(psi)	
3/4 x 0.65 wall	6,400	9,000
3/4 x 0.83 wall	8,300	11,750
3/4 x 0.95 wall	9,650	13,700
3/4 x .109 wall	11,200	16,050
3/4 x .120 wall	12,500	18,000
3/4 x .134 wall	14,150	20,000
1 x 0.83 wall	6,100	8,600
1 x 0.95 wall	7,050	9,950
1 x .109 wall	8,200	11,600
1 x .120 wall	9,100	12,900
1 x .134 wall	10,250	14,650
1 x .156 wall	12,150	17,450

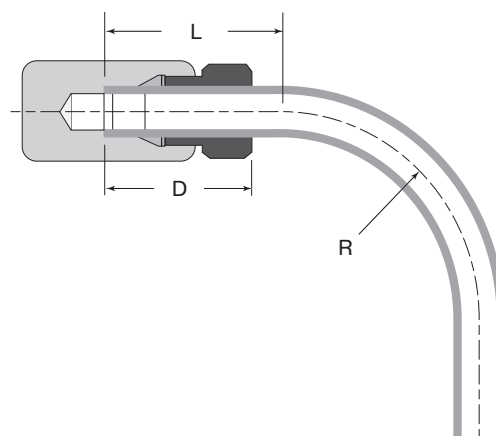
#### Temperature Derate Factors (ASTM A789 Annealed Seamless 2507 Instrumentation Tube)

	Temperature Derating Factors				
	°F	°C	°F	°C	°F
°F	-60 °F to 100 °F	200 °F	300 °F	400 °F	500 °F
°C	-51 °C to 40 °C	93 °C	149 °C	204 °C	260 °C
Super Duplex 2507	1.00	0.99	0.94	0.91	0.89

## Tube Bend Radii

### MPI™ Fitting Minimum Straight Tube Length and Bend Radii

		<b>D</b>	<b>L</b>	<b>R</b>
MPI™ Size No.	Nominal Tube OD (in)	Tube Insertion Depth (in)	Minimum Straight Length (in)	MPI™ Tube Recommended Bend Radius (in)
4	0.25	1.34	1.62	.75
6	0.375	1.58	1.88	1.25
8	0.5	1.85	2.25	2.0
9	.56	1.91	2.25	2.0
12	.75	2.26	2.75	3.0
16	1.0	2.88	3.38	4.0



The recommend tube bend radius can be achieved using the Parker 424 crank bender with long radius bending blocks.

### Cone & Thread Tubing Minimum Tube Bend Radius

	<b>R</b>
Nominal O.D. (in)	Bend Radius (in)
1/4	1.25
3/8	1.75
9/16	2.63
3/4	3.5
1	4.63

### Tube Cutting and Preparation

1. Cut the tube with either a tube cutter or saw so that the end is square within 1°.
2. Debur both the OD and ID of the tube ends.
3. Clean the tube to remove any debris left form the deburring operation.

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**14. Cancellations and Changes.** Buyer may not cancel or modify, including but not limited to movement of delivery dates for the Products, any order for any reason except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage and any additional expense. Seller, at any time, may change features, specifications, designs and availability of Products.

**15. Assignment.** Buyer may not assign its rights or obligations without the prior written consent of Seller.

**16. Force Majeure.** Seller is not liable for delay or failure to perform any of its obligations by reason of any events or circumstances beyond its reasonable control. Such circumstances include without limitation: accidents, labor disputes or stoppages, government acts or orders, acts of nature, pandemics, epidemics, other widespread illness, or public health emergency, cyber related disruptions, cyber-attacks, ransomware sabotage, delays or failures in delivery from carriers or suppliers, shortages of materials, sudden increases in the price of raw material or components, shutdowns or slowdowns affecting the supply of raw materials or components, or the transportation thereof, oil shortages or oil price increases, energy crisis, energy or fuel interruption, war (whether declared or not) or the serious threat of same, riots, rebellions, acts of terrorism, embargoes, fire or any reason whether similar to the foregoing or otherwise. Seller will resume performance as soon as practicable after the event of force majeure has been removed. All delivery dates affected by an event of force majeure shall be tolled for the duration of such event of force majeure and rescheduled for mutually agreed dates as soon as practicable after the event of force majeure ceases to exist. The right to allocate capacity is in the Seller's sole discretion. An event of force majeure shall not include financial distress, insolvency, bankruptcy, or other similar conditions affecting one of the parties, affiliates and/or subcontractors. An event of force majeure in the meaning of these Terms means any circumstances beyond Seller's control that permanently or temporarily hinders performance, even where that circumstance was already foreseen. Buyer shall not be entitled to cancel any orders following its claim of an event of force majeure.

**17. Waiver and Severability.** Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice either party's right to enforce that provision in the future. Invalidation of any provision of these Terms shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

**18. Duration.** Unless otherwise stated in the Quote, any agreement governed by or arising from these Terms shall: (a) be for an initial duration of one (1) year; and (b) shall automatically renew for successive one-year terms unless terminated by Buyer with at least 180-days written notice to Seller or if Seller terminates the agreement pursuant to Section 19 of these Terms.

**19. Termination.** Seller may, without liability to Buyer, terminate any agreement governed by or arising from these Terms for any reason and at anytime by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms, (b) becomes or is deemed insolvent, (c) appoints or has appointed a trustee, receiver or custodian for all or any part of Buyer's property, (d) files a petition for relief in bankruptcy on its own behalf, or one is filed against Buyer by a third party, (e) makes an assignment for the benefit of creditors; or (f) dissolves its business or liquidates all or a majority of its assets.

**20. Ownership of Rights.** Buyer agrees that (a) Seller (and/or its affiliates) owns or is the valid licensee of Seller's IP and (b) the furnishing of information, related documents or other materials by Seller to Buyer does not grant or transfer any ownership interest or license in or to Seller's IP to Buyer, unless expressly agreed in writing. Without limiting the foregoing, Seller retains ownership of all Software supplied to Buyer. In no event shall Buyer obtain any greater right in and to the Software than a right in a license limited to the use thereof and subject to compliance with any other terms provided with the Software. Buyer further agrees that it will not, directly or through intermediaries, reverse engineer, decompile, or disassemble any Software (including firmware) comprising or contained within a Product, except and only to the extent that such activity may be expressly permitted, either by applicable law or, in the case of open source software, the applicable open source license.

**21. Indemnity for Infringement of Intellectual Property Rights.** Seller is not liable for infringement of any Intellectual Property Rights except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a third-party claim that one or more of the Products infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by Seller to Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer (including Seller's use of Buyer's Property); or (ii) directed to any Products for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for claims of infringement of Intellectual Property Rights.

**22. Governing Law.** These Terms, the terms of any Quote, and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to the sale and delivery of the Products.

**23. Entire Agreement.** These Terms, along with the terms set forth in the Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale and purchase. In the event of a conflict between any term set forth in the Quote and these Terms, the terms set forth in the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. No modification to these Terms will be binding on Seller unless agreed to in a writing that is signed by an authorized representative of Seller, excluding email correspondence, 'click-wrap' or other purported electronic assent to different or additional terms. Sections 2-25 of these Terms shall survive termination or cancellation of any agreement governed by or arising from these Terms.

**24. No 'Wrap' Agreements/No Authority to Bind.** Seller's clicking any buttons or any similar action, such as clicking "I Agree" or "Confirm," to utilize Buyer's software or webpage for the placement of orders, is NOT an agreement to Buyer's Terms and Conditions. NO EMPLOYEE, AGENT OR REPRESENTATIVE OF SELLER HAS THE AUTHORITY TO BIND SELLER BY THE ACT OF CLICKING ANY BUTTON OR SIMILAR ACTION ON BUYER'S WEBSITE OR PORTAL.

**25. Compliance with Laws.** Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer represents that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Products from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws. Buyer agrees to promptly and reliably provide Seller all requested information or documents, including end-user statements and other written assurances, concerning Buyer's ongoing compliance with Export Law.

09/2022







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1005 A Cleaner Way  
Huntsville, AL 35805 USA  
phone 256 881 2040  
fax 256 881 5072  
**parker.com/ipd**

MPI™ Series Medium Pressure Products: Instructional Manual  
Catalog 4234-B1 March 2025

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